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#10 2/4/04 DS

UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

QINGFENG TANG

Group Art Unit: 2631

Examiner: Kumar, Pankaj

Serial No.: 09/506,043

Filed: February 17, 2000

For: TUNELESS NARROW-BAND SUPER-REGENERATIVE RECEIVER

Attorney Docket No.: LUTA 0252 PUS

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal brief in support of the appeal from the final rejection of claims 1-6 of the Office Action dated June 18, 2003. An advisory action was mailed on October 3, 2003. The notice of appeal was filed on October 21, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Lear Corporation, a corporation organized and existing under the laws of the state of Delaware, and having a place of business at 21557 Telegraph Road, Southfield, Michigan 48034, as set forth in the assignment recorded in the

U.S. Patent and Trademark Office on February 17, 2000 at Reel 010573/Frame 0831.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-6 are pending in this application. Claims 1-6 have been rejected and are the subject of this appeal.

IV. STATUS OF AMENDMENTS

A response after final was filed on September 18, 2003. The response did not contain any amendments.

V. SUMMARY OF THE INVENTION

The invention generally relates to radio frequency (RF) receivers. More particularly, the invention relates to an improved super-regenerative receiver arrangement capable of receiving narrow-band signals. (Specification, p. 1, ll. 3-5.)

Generally, a super-regenerative receiver operates using an oscillating signal detector having the oscillation interrupted, that is, quenched, at a relatively low frequency. Because the quenching operation and frequency force the detector response to be very broad, super-regenerative receivers suffer from the need to use tuned input circuits to allow them to be used with narrow-band signals. (Specification, p. 1, ll. 9-14.)

Claim 1 recites a narrow bandwidth, super-regenerative receiver 10. Receiver 10 comprises a signal detector having a regenerative oscillator 12 for detecting a signal 14 transmitted at a particular transmit frequency f_{Tx}. Receiver 10 further comprises a quench circuit 20. Quench circuit 20 is connected to the regenerative oscillator 12 for interrupting the oscillation of the oscillator 12 at a predetermined frequency f_q. Receiver 10 further comprises a frequency sweeping circuit 16. Frequency sweeping circuit 16 has a sweep frequency f_s. Frequency sweeping circuit 16 is connected to the regenerative oscillator 12 and to the quench circuit 20. The quench circuit 20 is arranged to cycle the regenerative oscillator 12 and the frequency sweeping circuit 16 on and off together. The frequency sweeping circuit 16 controls operation of the regenerative oscillator 12 to a desired narrow bandwidth around the transmit frequency f_{Tx}. (Specification, p. 2, ll. 4-13; p. 3, ll. 1-18 and 27-28.)

Claim 2 further recites a center frequency f_c, a sweep frequency f_s, a quench frequency f_q, a data rate or a maximum base band frequency of the transmitted signal f_d, and a sweep frequency bandwidth BW_s with the following design characteristics:

BW_s = 1-3 %f_c;

$f_s = f_q$;

$f_s > 2$ fd; and

$f_c >> f_s$ or f_q.

Claim 3 further recites that $f_s = 10f_d$. (Specification, p. 3, ll. 19-26.)

Claim 4 further recites that the frequency sweeping circuit comprises a surface acoustic wave resonator. Claim 5 further recites that the frequency sweeping circuit comprises a ceramic resonator. Claim 6 further recites that the frequency sweeping circuit comprises an LC resonator. (Specification, p. 3, ll. 9-10.)

VI. ISSUES

1. Whether claim 1 is anticipated under 35 U.S.C. § 102(b) by Niki (U.S. Pat. No. 4,620,147).

2. Whether claims 2-6 are unpatentable under 35 U.S.C. § 103(a) over Niki (U.S. Pat. No. 4,620,147).

VII. GROUPING OF CLAIMS

1. Claim 1 has been rejected on its own.
2. Claims 2-6 stand or fall together.

VIII. ARGUMENT

1. Claim 1 - Anticipation Under 35 U.S.C. § 102(b) By Niki (U.S. Pat. No. 4,620,147)

Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Niki (U.S. Patent No. 4,620,147). Appellant believes that the invention is patentable, and that claim 1 is not anticipated by Niki.

Claim 1 recites a narrow bandwidth, super-regenerative receiver. The receiver comprises a signal detector, a quench circuit and a frequency sweeping circuit. The signal detector has a regenerative oscillator for detecting a signal transmitted at a particular transmit frequency. The quench circuit is connected to the regenerative oscillator for interrupting the oscillation of the oscillator at a predetermined frequency.

The frequency sweeping circuit is connected to the regenerative oscillator and the quench circuit. The quench circuit is arranged to cycle the regenerative oscillator and the

frequency sweeping circuit on and off together. The frequency sweeping circuit controls operation of the regenerative oscillator to a desired narrow bandwidth around the transmit frequency.

Put another way, claim 1 recites a super-regenerative receiver composed of a signal detector having a regenerative oscillator and a quench circuit connected to the regenerative oscillator, wherein a frequency sweeping circuit is connected to the regenerative oscillator and the quench circuit to control operation of the regenerative oscillator to a desired narrow bandwidth around the transmit frequency.

That is, the addition of the frequency sweeping circuit to the regenerative oscillator and quench circuit is advantageous in that it results in the regenerative oscillator functioning as a center frequency moveable (sweeping) bandpass filter with a narrow band. As explained in the background art on page 1 of appellant's specification, prior super-regenerative receivers suffer from the need to use tuned input circuits to allow the use with narrow band signals. Appellant's invention addresses this problem by providing an improved super-regenerative receiver including a frequency sweeping circuit among other elements as recited by claim 1.

Niki describes a signal detector of a far different type in that the Niki signal detector utilizes a mixer and then an envelope detector at intermediate frequency (IF). Such IF techniques are far different than regenerative techniques in that these IF techniques do not utilize a regenerative oscillator and associated quench circuit. In contrast, IF techniques use a local oscillator to down mix an input signal to IF and then detect the envelope thereof. Turning to Niki, Niki describes a signal detector wherein the envelope of an IF signal corresponding to the desired frequency component is set to be above a desired level in a single sweep of a local oscillator by comparing the envelope with a predetermined value for controlling the attenuation of the input signal. After the attenuation is set, only the desired

frequency component has an envelope larger than the predetermined value so that the desired frequency component is easily identified in the next sweep.

In contrast, claim 1 recites a super-regenerative receiver including, among other limitations, a regenerative oscillator connected to a quench circuit in combination with a frequency sweeping circuit. Niki is a different type of signal detector and fails to describe several of the claimed elements and relationships among these elements.

More specifically, Niki fails to anticipate the invention recited by claim 1. Niki fails to describe a signal detector having a regenerative oscillator as recited by claim 1. The Examiner directs appellant's attention to local oscillator 105. Local oscillator 105 is not a regenerative oscillator as recited by claim 1 but is only a local oscillator controlled by sweep generator 106 for use in an IF envelope detection arrangement.

Further, Niki does not describe a quench circuit connected to a regenerative oscillator as recited by claim 1. Niki only describes gates 136 and 137 and gate signal generator 138 which are not for interrupting or quenching the oscillation of a regenerative oscillator at a predetermined frequency.

In the final action, the Examiner states that "local oscillators regenerate samples after every cycle" and "in Figure 7 of Niki, 137 is directly connected to 105 and 136 and 138 are indirectly connected to 105." However, the claimed super-regenerative receiver recites a signal detector having a regenerative oscillator with a quench circuit connected to the regenerative oscillator for interrupting the oscillation of the oscillator at a predetermined frequency. Niki fails to suggest these particular items with the specifically recited relationship. That is, Niki does not describe the regenerative receiver action comprehended by claim 1 but instead utilizes downmixing and envelope detection at IF. There is no quench circuit

interrupting oscillations of a regenerative oscillator, let alone any teaching of the combination recited by claim 1 that further includes the sweeping circuit.

The Examiner directs appellant's attention to sweep generator 106 connected to local oscillator 105, however, local oscillator 105 is not a regenerative oscillator and is not controlled to oscillate in a narrow bandwidth around the transmit frequency. Put another way, the fact that Niki shows sweep generator 106 connected to local oscillator 105 fails to suggest the specifically claimed elements and relationship among these elements in claim 1.

The Examiner has pointed to several different parts of Niki and has attempted to read appellant's claim 1 onto those individual parts. However, claim 1 recites specific elements and relationships among these elements that achieve a super-regenerative receiver that is not suggested by Niki, as Niki only suggest downmixing and envelope detection at IF which is far different than the regenerative detection techniques including a sweep circuit of appellant's invention.

In the advisory action, the Examiner offers paragraphs 1-8 in response to appellant's previous arguments. Paragraphs 1-8 of the advisory action are specifically addressed below.

Regarding paragraph 1 of the advisory action, the Examiner notes the preamble of claim 1. In this appeal brief, appellant points out reasons for patentability of the claims while making reference to specific elements and relationships among these elements in the body of claim 1. To the extent that appellant has used the preamble phrase "narrow bandwidth, super-regenerative receiver," appellant notes that it is the specific elements and relationship among these elements in the body of claim 1 that actually form the "narrow bandwidth, super-regenerative receiver." Thus, claim 1 is believed to be patentable whether or not the preamble is accorded any patentable weight.

Regarding paragraphs 2-5 of the advisory action, the Examiner makes various statements about the teachings of Niki. The Examiner points to several different parts of Niki and has attempted to read appellant's claim 1 onto those individual parts. However, claim 1 recites a specific combination of structures and functions by reciting specific elements and relationships among these elements. Although it is possible for the Examiner to attempt to read various features of claim 1 taken individually onto individual parts of Niki, appellant maintains that Niki fails to anticipate the specific combination in its entirety as recited by claim 1.

Regarding paragraph 6 of the advisory action, the Examiner states that appellant's claim 1 is so broad that even though Niki teaches downmixing and envelope detection, Niki also teaches the limitations of claim 1 as explained during a number of office actions. As stated above, appellant points out that claim 1 recites a specific combination of structures and functions by reciting specific elements and relationships among these elements. The Examiner has attempted to read various features recited by appellant's claim 1 onto various individual parts of Niki, but the Examiner has failed to show that the specific elements and relationships among these elements taken together as recited by claim 1 are anticipated by Niki. Appellant reminds the Examiner that claim 1 is not merely an aggregate of parts, but instead is a receiver comprising specific elements and relationships among these elements that achieve a receiver that is not suggested by Niki.

Regarding paragraphs 7 and 8 of the advisory action, the Examiner makes further statements regarding the fact that the Examiner is unpersuaded by appellant's previous arguments.

Above, appellant has given a number of reasons why Niki fails to anticipate claim 1. Below, appellant provides further clarification of some of these arguments and makes reference to specific limitations in claim 1.

Claim 1 recites "a signal detector having a regenerative oscillator for detecting a signal transmitted at a particular transmit frequency." Niki only describes local oscillator 105 which is not a regenerative oscillator but is only a local oscillator controlled by sweep generator 106 for use in an IF envelope detection arrangement. Further, local oscillator 105 of Nikki is not "for detecting a signal transmitted at a particular transmit frequency" as recited by claim 1. Local oscillator 105 instead functions as an input to mixer 102 which also receives a signal passing from attenuator 101.

Claim 1 recites "a quench circuit connected to the regenerative oscillator for interrupting the oscillation of the oscillator at a predetermined frequency." Niki only describes gates 136 and 137 and gate signal generator 138. Further, the gates in Niki are not "for interrupting the oscillation of the oscillator at a predetermined frequency" as recited by claim 1. Gate 137 (Figure 7) does receive the output of local oscillator 105 but there is no indication that gate 137 interrupts the oscillation of the local oscillator, it is only shown that the output of gate 137 feeds counter 140.

Claim 1 recites "a frequency sweeping circuit connected to the regenerative oscillator and the quench circuit, wherein the quench circuit is arranged to cycle the regenerative oscillator and the frequency sweeping circuit on and off together, and the frequency sweeping circuit controls operation of the regenerative oscillator to a desired narrow bandwidth around the transmit frequency." Niki only describes sweep generator 106. Note that the gates referred to by the Examiner as the quench circuit are not "arranged to cycle the regenerative oscillator and the frequency sweeping circuit on and off together" as recited by claim 1.

Above, appellant has specified the errors in the rejection and why the rejected claim 1 is patentable. Appellant has also provided in detail example of the various limitations

in claim 1 that are not described in the prior art. Accordingly, claim 1 is believed to be patentable over Niki.

2. Claims 2-6 - Unpatentability Under 35 U.S.C. § 103(a) Over Niki (U.S. Pat. No. 4,620,147)

Claims 2-6 are dependent claims that depend from base claim 1, and are believed to be patentable for at least the reasons for patentability presented above for claim 1. Note that claims 2-6 stand rejected based on the same reference as claim 1.

IX. FEES DUE

The fee of $330.00 as applicable under the provisions of 37 C.F.R. § 1.17(c) is enclosed. The fee of $110.00 for a one-month extension of time is also enclosed. Please charge any additional fee or credit any overpayment in connection with this filing to our Deposit Account No. 02-3978.

Respectfully submitted,

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Date: January 21, 2004

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Enclosure - Appendix

IX. APPENDIX - CLAIMS ON APPEAL

1. A narrow bandwidth, super-regenerative receiver comprising:

a signal detector having a regenerative oscillator for detecting a signal transmitted at a particular transmit frequency;

a quench circuit connected to the regenerative oscillator for interrupting the oscillation of the oscillator at a predetermined frequency; and

a frequency sweeping circuit connected to the regenerative oscillator and the quench circuit, wherein the quench circuit is arranged to cycle the regenerative oscillator and the frequency sweeping circuit on and off together, and the frequency sweeping circuit controls operation of the regenerative oscillator to a desired narrow bandwidth around the transmit frequency.

2. The receiver of claim 1 further comprising: for a center frequency f_c, a sweep frequency f_s, a quench frequency f_q, a data rate or a maximum base band frequency of the transmitted signal f_d, and a sweep frequency bandwidth BW_s, the following design characteristics:

BW_s = 1-3 $\%f_c$;

$f_s = f_q$;

$f_s > 2$ fd; and

$f_c >> f_s$ or f_q.

3. The receiver of claim 2 wherein $f_s = 10f_d$.

4. The receiver of claim 1 wherein the frequency sweeping circuit comprises a surfaced acoustic wave resonator.

5. The receiver of claim 1 wherein the frequency sweeping circuit comprises a ceramic resonator.

6. The receiver of claim 1 wherein the frequency sweeping circuit comprises an LC resonator.